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MEMORANDUM

DATE 12 January 1999
TO: David Bennett, WAM, U S. EPA, Region X
FROM: Michelle Turner, Chemist, WESTON, Seattle
Rnm Roger McGinnis, Senior Environmental Chemist, WESTON, Seattle
SUBJECT: Validation of Inorganics Data
Laboratory Batch:K9805975
Site: Duwamish River

WORK ASSIGNMENT NO.: 46-23-0JZZ

WORK ORDER NO : 4000-019-038-5200-00

DOC. CONTROL NO.: 4000-019-038-AAAK

cc Bruce Woods, RAP-WAM, U.S. EPA, Region X
Dena Hughes, Site Manager, WESTON, Seattle (memo only)
Kevin Mundell-Jackson, Database Management, WESTON, Seattle

The quality assurance review of twenty sediment samples, laboratory batch K9805975, collected from the Duwamish River has been completed. The sediment samples were analyzed for inorganics by Columbia Analytical Services of Kelso, Washington using EPA Methods 200, 6010, 6020, and 7000 series as required to achieve detection limit goals. The samples were numbered:

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QA Review Batch K9805975 (Inorganics/Metals)

Site. Duwamish River

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98364002	98364003	98364004	98364005	98364006
98364007	98364008	98364009	98364010	98364011
98364012	98364024	98364025	98364026	98364027
98364028	98364029	98364030	98364031	98364032

Data Qualifications

The following comments refer to the laboratory performance in meeting the quality control criteria described in the technical specifications of the laboratory subcontract. The review follows the format described in the U.S. EPA *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA OSWER 9240.1-05-01, February 1994) modified to include specific requirements of the analytical methods

1. Holding Times

Holding times of 28 days for mercury and six months (from date of collection to analysis) were established in the project Sampling and Analysis Plan. All samples met holding time criteria.

2. Calibration

a) Initial Calibration

Initial calibration frequencies and QC criteria were met for ICP and ICP/MS analyses.

Mass calibration for all ICP/MS internal standards was within 0.1 atomic mass unit of the true mass. ICP/MS resolution was less than 0.9 amu full width at 10 percent peak height.

b) CRI/CRA Standards

Instrument calibration was verified using low level standards near the project required detection limit

c) Initial and Continuing Calibration Verification

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All inductively coupled plasma (ICP) and ICP/MS results met control limits of 90 to 110 percent recovery (percent R) of the true values for both initial and continuing calibration with the following exceptions:

Sample	Compound	%Recovery
CCV3	Arsenic	118
CCV3	Lead	111
CCV3	Nickel	112
CCV3	Selenium	112
CCV3	Thallium	112

Samples preceding this continuing calibration standard (98364007 – 4012 and 98364024 – 4027) were reanalyzed for Arsenic. Results for Lead, Nickel, Selenium and Thallium are qualified as estimated (J).

Mercury cold vapor AA (CVAA) results met control limits of 80 to 120 percent recovery (percent R) for both initial and continuing calibration.

3 Instrument Détection Limits

All instrument detection limits (IDL) for ICP, ICP/MS, and mercury analyses met project requirements specified in the project Sampling and Analysis Plan

4. Blanks

a) Laboratory Method Blanks

The following analytes were detected in laboratory method blanks.

Blank ID	Analyte	Concentration	Associated Samples
K9805975-MB	Cadmium	0.06 mg/Kg	98364002 through 98364012 98364024 through 98364032
K9805975-MB	Lead	0.05 mg/Kg	98364002 through 98364012 98364024 through

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Blank ID	Analyte	Concentration	Associated Samples
			98364032
K9805975-MB	Nickel	0.2 mg/Kg	98364002 through 98364012 98364024 through 98364032
K9805975-MB	Tin	1.0 mg/Kg	98364002 through 98364012 98364024 through 98364032

Results for analytes listed above were qualified as undetected (UJ) if concentrations in associated samples were less than five times the concentration present in the blank.

b) Initial Calibration and Continuing Calibration Blanks

The following elements were found in calibration blanks.

Blank ID	Analyte	Concentration	Associated Samples
CCB1	Arsenic	0.1 µg/L	98364002 through 98364006
CCB1	Cadmium	0.02 µg/L	98364002 through 98364006
CCB2	Arsenic	0.2 µg/L	98364007 through 98364012 98364024 through 98364027
CCB2	Cadmium	0.1 µg/L	98364007 through 98364012 98364024 through 98364027
CCB2	Thallium	0.02 µg/L	98364007 through 98364012 98364024 through 98364027

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Blank ID	Analyte	Concentration	Associated Samples
CCB3	Cadmium	0.1 µg/L	none
CCB4	Arsenic	0.2 µg/L	98364028 through 98364032 98364007 through 98364010(reruns)
CCB4	Cadmium	0.06 µg/L	98364028 through 98364032 98364007 through 98364010(reruns)
CCB4	Thallium	0.01 µg/L	98364028 through 98364032 98364007 through 98364010(reruns)
CCB5	Arsenic	0.3 µg/L	98364011(rerun) 98364012(rerun) 98364024 through 98364027 (reruns)
CCB5	Cadmium	0.05 µg/L	98364011(rerun) 98364012(rerun) 98364024 through 98364027 (reruns)
CCB5	Selenium	0.5 µg/L	98364011(rerun) 98364012(rerun) 98364024 through 98364027 (reruns)
CCB6	Arsenic	0.4 µg/L	none
CCB6	Cadmium	0.08 µg/L	none

Results for analytes listed above were qualified as undetected (UJ) if concentrations in associated samples were less than five times the concentration present in the blank.

c) Field Blanks

No field blank samples were associated with this laboratory batch.

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5. ICP and ICP/MS Interference Check

All analytes for the interference check samples were within the control limits of 80 to 120 percent of the true values. Internal standard intensities for analytes determined by ICP/MS were within \pm 20 percent of the initial calibration intensity.

6. Laboratory Control Sample

Laboratory control sample recoveries were within the control limits (P-project, L-laboratory) for all analytes except the following:

Analyte	% Recovery	QC Limit
Antimony	126	80-120 (P) 20-180 (L)
Iron	134	80-120 (P) 43-157 (L)

The recoveries for Antimony and Iron were above the upper project QC limit, indicating potential high bias. Positive results for the above elements were qualified as estimated (J).

7. Laboratory Duplicate Sample Analysis

Relative percent differences (RPD) between analytical results were within the QC limit of 35 percent (or \pm 2 times the quantitation limit for concentrations < 5 times the quantitation limit) with the following exceptions:

Analyte	RPD
Calcium	111

Results for the above analytes have been qualified as estimated (J)

8. Spiked Sample Analysis

The matrix spike recoveries for the following analytes were outside QC limits

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Site: Duwamish River

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Sample	Analyte	Percent Recovery	QC Limits
98364002	Antimony	44	75-125

In addition, as the native sample concentrations for Aluminum and Iron exceeded the spike concentration by more than 4 times, recoveries were not calculated. Data were not qualified solely on matrix spike results.

9. ICP and ICP/MS Serial Dilution

Serial dilutions were not routinely performed for this SDG.

10. ICP/MS Quality Control

a) Duplicate Analysis

Duplicate analyses were not performed for this SDG

b) Post Digest Spike Recovery

Post digest spikes were not performed for this SDG

c) Method of Standard Additions

No samples required MSA analysis.

d) ICP/MS Internal Standards

The intensity of all internal standards was within limits of 30 to 120 percent of the initial calibration intensity for all samples.

10. Field Duplicate Analysis

Samples 98364011 and 98364012 were field duplicates. The relative percent difference between duplicate results was within limits of 35 percent RPD for all analytes except:

Analyte	Initial Result	Duplicate Result	% RPD
Arsenic	35 4	22 3	45 4

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Results for the analytes listed above were qualified as estimated (J) in samples 98364011 and 98364012

11. Sample Analysis

A cursory raw data review was performed. All laboratory deliverables were present and complete. The case narrative indicated that the MS recovery of Antimony for sample 98364002 was outside the QC limits because of suspected matrix interference. As the LCS recovery was in control, no further action was taken. The MS recovery of Aluminum and Iron in this sample were not calculated as the sample concentration was significantly higher than the added spike concentration. The RPD for the replicate analysis of Calcium in sample 98364002 was outside the QC limits due to the heterogeneous character of the sample. Method prescribed mixing techniques were used, but were not sufficient for sample homogenization. No other problems were noted.

12 Laboratory Contact

No laboratory contact was required

Data Assessment

Upon consideration of the data qualifications noted above, the data are ACCEPTABLE for use except where flagged with data qualifiers that modify the usefulness of the individual values.

Data Qualifiers

U - The material was analyzed for, but was not detected.

UJ - The analyte was not detected. The associated quantitation limit is an estimate because quality control criteria were not met.

J - The analyte was positively identified, but the associated numerical value is an estimated quantity because quality control criteria were not met or because concentrations reported were less than the CRDL or lowest calibration standard.

R - Quality control indicates that data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification.

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805975
Date Collected: 8/31/98
Date Received: 9/1/98

Total Metals

Sample Name	98364002							Units	mg/Kg (ppm)
Lab Code	K9805975-001 <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>Basis</th> <th>Dry</th>							Basis	Dry
Test Notes									
Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	13100	
Antimony	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	ND	WT
Arsenic	EPA 3050B	200 8	0 5	0 1	10	9/21/98	10/13/98	8 4	
Barium	EPA 3050B	6010B	1	0 6	2	9/17/98	10/19/98	61	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	9/21/98	10/13/98	0.22	
Cadmium	EPA 3050B	200 8	0 2	0 02	10	9/21/98	10/13/98	0 5	
Calcium	EPA 3050B	6010B	10	3	2	9/17/98	10/19/98	20400	WT
Chromium	EPA 3050B	6010B	2	0 7	2	9/17/98	10/19/98	28	
Cobalt	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	7	
Copper	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	47	
Iron	EPA 3050B	6010B	4	4	2	9/17/98	10/19/98	20600	WT
Lead	EPA 3050B	200 8	0 02	0 004	10	9/21/98	10/13/98	46 4	WT
Magnesium	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	5590	
Manganese	EPA 3050B	6010B	1	0 4	2	9/17/98	10/19/98	211	
Mercury	7471A	7471A	0 05	0 02	1	9/14/98	9/16/98	0 21	
Nickel	EPA 3050B	200 8	0 2	0 02	10	9/21/98	10/13/98	21 4	
Potassium	EPA 3050B	6010B	400	400	2	9/17/98	10/19/98	1500	
Selenium	EPA 3050B	200 8	1	0 3	10	9/21/98	10/13/98	11	
Silver	EPA 3050B	200 8	0 02	0 004	10	9/21/98	10/13/98	0 44	
Sodium	EPA 3050B	6010B	20	20	2	9/17/98	10/19/98	6160	
Thallium	EPA 3050B	200 8	0 02	0 006	10	9/21/98	10/13/98	0 16	
Tin	EPA 3050B	200 8	2	0 05	10	9/21/98	10/13/98	6	
Vanadium	EPA 3050B	6010B	2	0 6	2	9/17/98	10/19/98	51	
Zinc	EPA 3050B	6010B	2	0 8	2	9/17/98	10/19/98	99	

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05975ICP GS1 - Sample 10/19/98

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805975
Date Collected: 8/31/98
Date Received: 9/1/98

Total Metals

Sample Name	98364002	Units	mg/Kg (ppm)
Lab Code	K9805975-001	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	13100	
Antimony	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	ND	WT
Arsenic	EPA 3050B	200 8	0.5	0.1	10	9/21/98	10/13/98	8.4	
Barium	EPA 3050B	6010B	1	0.6	2	9/17/98	10/19/98	61	
Beryllium	EPA 3050B	200 8	0.02	0.02	10	9/21/98	10/13/98	0.22	
Cadmium	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	0.5	
Calcium	EPA 3050B	6010B	10	3	2	9/17/98	10/19/98	20400	WT
Chromium	EPA 3050B	6010B	2	0.7	2	9/17/98	10/19/98	28	
Cobalt	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	7	
Copper	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	47	
Iron	EPA 3050B	6010B	4	4	2	9/17/98	10/19/98	20600	WT
Lead	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	46.4	WT
Magnesium	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	5590	
Manganese	EPA 3050B	6010B	1	0.4	2	9/17/98	10/19/98	211	
Mercury	7471A	0.05	0.02	1	9/14/98	9/16/98	0.21		
Nickel	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	21.4	
Potassium	EPA 3050B	6010B	400	400	2	9/17/98	10/19/98	1500	
Selenium	EPA 3050B	200 8	1	0.3	10	9/21/98	10/13/98	11	
Silver	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	0.44	
Sodium	EPA 3050B	6010B	20	20	2	9/17/98	10/19/98	6160	
Thallium	EPA 3050B	200 8	0.02	0.006	10	9/21/98	10/13/98	0.16	
Tin	EPA 3050B	200 8	2	0.05	10	9/21/98	10/13/98	6	
Vanadium	EPA 3050B	6010B	2	0.6	2	9/17/98	10/19/98	51	
Zinc	EPA 3050B	6010B	2	0.8	2	9/17/98	10/19/98	99	

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 05975ICP GJ1 Sample 10/19/98

Date 10/19/98

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805975
Date Collected: 8/31/98
Date Received: 9/1/98

Total Metals

Sample Name	98364003	Units	mg/Kg (ppm)
Lab Code	K9805975-002	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	14000	
Antimony	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	7	(J)
Arsenic	EPA 3050B	200 8	0 5	0 1	10	9/21/98	10/13/98	40 7	
Barium	EPA 3050B	6010B	1	0 6	2	9/17/98	10/19/98	83	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	9/21/98	10/13/98	0 36	
Cadmium	EPA 3050B	200 8	0 2	0 02	10	9/21/98	10/13/98	2 8	
Calcium	EPA 3050B	6010B	10	3	2	9/17/98	10/19/98	26400	
Chromium	EPA 3050B	6010B	2	0 7	2	9/17/98	10/19/98	38	
Cobalt	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	8	
Copper	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	60	
Iron	EPA 3050B	6010B	4	4	2	9/17/98	10/19/98	20400	J
Lead	EPA 3050B	200 8	0 02	0 004	10	9/21/98	10/13/98	411	
Magnesium	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	7100	
Manganese	EPA 3050B	6010B	1	0 4	2	9/17/98	10/19/98	233	
Mercury	7471A	7471A	0 05	0 02	1	9/14/98	9/16/98	0 39	
Nickel	EPA 3050B	200 8	0 2	0 02	10	9/21/98	10/13/98	30 3	
Potassium	EPA 3050B	6010B	400	400	2	9/17/98	10/19/98	1900	
Selenium	EPA 3050B	200 8	1	0 3	10	9/21/98	10/13/98	16	
Silver	EPA 3050B	200 8	0 02	0 004	10	9/21/98	10/13/98	1 98	
Sodium	EPA 3050B	6010B	20	20	2	9/17/98	10/19/98	8170	
Thallium	EPA 3050B	200 8	0 02	0 006	10	9/21/98	10/13/98	0 40	
Tin	EPA 3050B	200 8	2	0 05	10	9/21/98	10/13/98	14	
Vanadium	EPA 3050B	6010B	2	0 6	2	9/17/98	10/19/98	53	
Zinc	EPA 3050B	6010B	2	0 8	2	9/17/98	10/19/98	357	

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Date 10/19/98

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805975
Date Collected: 8/31/98
Date Received: 9/1/98

Total Metals

Sample Name	98364004	Units	mg/Kg (ppm)						
Lab Code	K9805975-003	Basis	Dry						
Test Notes									
Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	23600	
Antimony	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	ND	WT
Arsenic	EPA 3050B	200 8	0 5	0 1	10	9/21/98	10/13/98	16 5	
Barium	EPA 3050B	6010B	1	0 6	2	9/17/98	10/19/98	172	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	9/21/98	10/13/98	0 40	
Cadmium	EPA 3050B	200 8	0 2	0 02	10	9/21/98	10/13/98	1 0	
Calcium	EPA 3050B	6010B	10	3	2	9/17/98	10/19/98	8120	
Chromium	EPA 3050B	6010B	2	0 7	2	9/17/98	10/19/98	39	
Cobalt	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	11	
Copper	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	112	
Iron	EPA 3050B	6010B	4	4	2	9/17/98	10/19/98	31500	J
Lead	EPA 3050B	200 8	0 02	0 004	10	9/21/98	10/13/98	141	
Magnesium	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	8330	
Manganese	EPA 3050B	6010B	1	0 4	2	9/17/98	10/19/98	303	
Mercury	7471A	7471A	0 05	0 02	1	9/14/98	9/16/98	0 34	
Nickel	EPA 3050B	200 8	0 2	0 02	10	9/21/98	10/13/98	24 3	
Potassium	EPA 3050B	6010B	400	400	2	9/17/98	10/19/98	3100	
Selenium	EPA 3050B	200 8	1	0 3	10	9/21/98	10/13/98	18	
Silver	EPA 3050B	200 8	0 02	0 004	10	9/21/98	10/13/98	1 03	
Sodium	EPA 3050B	6010B	20	20	2	9/17/98	10/19/98	10400	
Thallium	EPA 3050B	200 8	0 02	0 006	10	9/21/98	10/13/98	0 17	
Tin	EPA 3050B	200 8	2	0 05	10	9/21/98	10/13/98	10	
Vanadium	EPA 3050B	6010B	2	0 6	2	9/17/98	10/19/98	73	
Zinc	EPA 3050B	6010B	2	0 8	2	9/17/98	10/19/98	197	

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 05975ICP GJ1 - Sample (3) 10/19/98

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Date 10/19/98 00008

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805975
Date Collected: 8/31/98
Date Received: 9/1/98

Total Metals

Sample Name	98364005	Units	mg/Kg (ppm)
Lab Code	K9805975-004	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	28100	
Antimony	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	ND	WT
Arsenic	EPA 3050B	200 8	0 5	0 1	10	9/21/98	10/13/98	19 7	
Barium	EPA 3050B	6010B	1	0 6	2	9/17/98	10/19/98	220	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	9/21/98	10/13/98	0 47	
Cadmium	EPA 3050B	200 8	0 2	0 02	10	9/21/98	10/13/98	1 0	
Calcium	EPA 3050B	6010B	10	3	2	9/17/98	10/19/98	8810	
Chromium	EPA 3050B	6010B	2	0 7	2	9/17/98	10/19/98	40	
Cobalt	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	12	
Copper	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	126	
Iron	EPA 3050B	6010B	4	4	2	9/17/98	10/19/98	36100	WT
Lead	EPA 3050B	200 8	0 02	0 004	10	9/21/98	10/13/98	152	
Magnesium	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	9400	
Manganese	EPA 3050B	6010B	1	0 4	2	9/17/98	10/19/98	345	
Mercury	7471A	7471A	0 05	0 02	1	9/14/98	9/16/98	0 34	
Nickel	EPA 3050B	200 8	0 2	0 02	10	9/21/98	10/13/98	24 7	
Potassium	EPA 3050B	6010B	400	400	2	9/17/98	10/19/98	3700	
Selenium	EPA 3050B	200 8	1	0 3	10	9/21/98	10/13/98	21	
Silver	EPA 3050B	200 8	0 02	0 004	10	9/21/98	10/13/98	0 93	
Sodium	EPA 3050B	6010B	20	20	2	9/17/98	10/19/98	13000	
Thallium	EPA 3050B	200 8	0 02	0 006	10	9/21/98	10/13/98	0 19	
Tin	EPA 3050B	200 8	2	0 05	10	9/21/98	10/13/98	11	
Vanadium	EPA 3050B	6010B	2	0 6	2	9/17/98	10/19/98	80	
Zinc	EPA 3050B	6010B	2	0 8	2	9/17/98	10/19/98	220	

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 IS44me/031695
 05975ICP GJ1 - Sample (4) 10/19/98

JC

Date 10/19/98

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Page No

WT, bkg

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805975
Date Collected: 8/31/98
Date Received: 9/1/98

Total Metals

Sample Name	98364006	Units.	mg/Kg (ppm)						
Lab Code	K9805975-005	Basis	Dry						
Test Notes									
Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	22100	
Antimony	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	7	(J)
Arsenic	EPA 3050B	200 8	0 5	0 1	10	9/21/98	10/13/98	15 3	
Barium	EPA 3050B	6010B	1	0 6	2	9/17/98	10/19/98	93	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	9/21/98	10/13/98	0 38	
Cadmium	EPA 3050B	200 8	0 2	0 02	10	9/21/98	10/13/98	0 8	
Calcium	EPA 3050B	6010B	10	3	2	9/17/98	10/19/98	7130	
Chromium	EPA 3050B	6010B	2	0 7	2	9/17/98	10/19/98	29	
Cobalt	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	10	
Copper	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	90	
Iron	EPA 3050B	6010B	4	4	2	9/17/98	10/19/98	27900	J
Lead	EPA 3050B	200 8	0 02	0 004	10	9/21/98	10/13/98	122	
Magnesium	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	7080	
Manganese	EPA 3050B	6010B	1	0 4	2	9/17/98	10/19/98	262	
Mercury	7471A	7471A	0 05	0 02	1	9/14/98	9/16/98	0 27	
Nickel	EPA 3050B	200 8	0 2	0 02	10	9/21/98	10/13/98	18 7	
Potassium	EPA 3050B	6010B	400	400	2	9/17/98	10/19/98	2800	
Selenium	EPA 3050B	200 8	1	0 3	10	9/21/98	10/13/98	17	
Silver	EPA 3050B	200 8	0 02	0 004	10	9/21/98	10/13/98	0 63	
Sodium	EPA 3050B	6010B	20	20	2	9/17/98	10/19/98	8880	
Thallium	EPA 3050B	200 8	0 02	0 006	10	9/21/98	10/13/98	0 14	
Tin	EPA 3050B	200 8	2	0 05	10	9/21/98	10/13/98	8	
Vanadium	EPA 3050B	6010B	2	0 6	2	9/17/98	10/19/98	68	
Zinc	EPA 3050B	6010B	2	0 8	2	9/17/98	10/19/98	155	

mg/kg, 1/2/99

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 IS44mc/031695
 05975ICP GJ1 Sample (S) 10/19/98

JC

Date 10/19/98

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805975
Date Collected: 8/31/98
Date Received: 9/1/98

Total Metals

Sample Name	98364007	Units	mg/Kg (ppm)
Lab Code	K9805975-006	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	24800	
Antimony	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	ND	UQT
Arsenic	EPA 3050B	200 8	0.5	0.1	10	9/21/98	10/13/98	16.5	
Barium	EPA 3050B	6010B	1	0.6	2	9/17/98	10/19/98	104	
Beryllium	EPA 3050B	200 8	0.02	0.02	10	9/21/98	10/13/98	0.42	
Cadmium	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	0.7	
Calcium	EPA 3050B	6010B	10	3	2	9/17/98	10/19/98	6470	
Chromium	EPA 3050B	6010B	2	0.7	2	9/17/98	10/19/98	29	
Cobalt	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	11	
Copper	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	64	
Iron	EPA 3050B	6010B	4	4	2	9/17/98	10/19/98	30300	J
Lead	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	89.8	J
Magnesium	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	7650	
Manganese	EPA 3050B	6010B	1	0.4	2	9/17/98	10/19/98	309	
Mercury	7471A	7471A	0.05	0.02	1	9/14/98	9/16/98	0.20	
Nickel	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	16.3	J
Potassium	EPA 3050B	6010B	400	400	2	9/17/98	10/19/98	3200	
Selenium	EPA 3050B	200 8	1	0.3	10	9/21/98	10/13/98	22	J
Silver	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	0.59	
Sodium	EPA 3050B	6010B	20	20	2	9/17/98	10/19/98	9660	
Thallium	EPA 3050B	200 8	0.02	0.006	10	9/21/98	10/13/98	0.14	J
Tin	EPA 3050B	200 8	2	0.05	10	9/21/98	10/13/98	7	
Vanadium	EPA 3050B	6010B	2	0.6	2	9/17/98	10/19/98	70	
Zinc	EPA 3050B	6010B	2	0.8	2	9/17/98	10/19/98	131	

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IS44mc/031695

05975(ICP GJ) Sample (6) 10/19/98

Date

10/19/98

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805975
Date Collected: 8/31/98
Date Received: 9/1/98

Total Metals

Sample Name	98364008	Units	mg/Kg (ppm)
Lab Code	K9805975-007	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	27200	
Antimony	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	ND	WT
Arsenic	EPA 3050B	200 8	0.5	0.1	10	9/21/98	10/13/98	9.1	
Barium	EPA 3050B	6010B	1	0.6	2	9/17/98	10/19/98	91	
Beryllium	EPA 3050B	200 8	0.02	0.02	10	9/21/98	10/13/98	0.47	
Cadmium	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	0.42	WT
Calcium	EPA 3050B	6010B	10	3	2	9/17/98	10/19/98	6860	
Chromium	EPA 3050B	6010B	2	0.7	2	9/17/98	10/19/98	31	
Cobalt	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	12	
Copper	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	51	
Iron	EPA 3050B	6010B	4	4	2	9/17/98	10/19/98	33200	J
Lead	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	24.9	J
Magnesium	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	8930	
Manganese	EPA 3050B	6010B	1	0.4	2	9/17/98	10/19/98	380	
Mercury	7471A	7471A	0.05	0.02	1	9/14/98	9/16/98	0.14	
Nickel	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	22.3	J
Potassium	EPA 3050B	6010B	400	400	2	9/17/98	10/19/98	3200	
Selenium	EPA 3050B	200 8	1	0.3	10	9/21/98	10/13/98	23	J
Silver	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	0.33	
Sodium	EPA 3050B	6010B	20	20	2	9/17/98	10/19/98	11900	
Thallium	EPA 3050B	200 8	0.02	0.006	10	9/21/98	10/13/98	0.13	J
Tin	EPA 3050B	200 8	2	0.05	10	9/21/98	10/13/98	4	WT
Vanadium	EPA 3050B	6010B	2	0.6	2	9/17/98	10/19/98	79	
Zinc	EPA 3050B	6010B	2	0.8	2	9/17/98	10/19/98	94	

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05975ICP GJ1 - Sample (7) 10/19/98

Date

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805975
Date Collected: 8/31/98
Date Received: 9/1/98

Total Metals

Sample Name	98364009	Units	mg/Kg (ppm)						
Lab Code	K9805975-008	Basis	Dry						
Test Notes									
Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	22100	
Antimony	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	ND	UCJ
Arsenic	EPA 3050B	200 8	0.5	0.1	10	9/21/98	10/13/98	15.4	
Barium	EPA 3050B	6010B	1	0.6	2	9/17/98	10/19/98	128	
Beryllium	EPA 3050B	200 8	0.02	0.02	10	9/21/98	10/13/98	0.40	
Cadmium	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	1.0	
Calcium	EPA 3050B	6010B	10	3	2	9/17/98	10/19/98	7240	
Chromium	EPA 3050B	6010B	2	0.7	2	9/17/98	10/19/98	39	
Cobalt	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	10	
Copper	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	187	
Iron	EPA 3050B	6010B	4	4	2	9/17/98	10/19/98	29000	J
Lead	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	77.3	J
Magnesium	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	7430	
Manganese	EPA 3050B	6010B	1	0.4	2	9/17/98	10/19/98	309	
Mercury	7471A	7471A	0.05	0.02	1	9/14/98	9/16/98	0.29	
Nickel	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	20.0	J
Potassium	EPA 3050B	6010B	400	400	2	9/17/98	10/19/98	2800	
Selenium	EPA 3050B	200 8	1	0.3	10	9/21/98	10/13/98	19	J
Silver	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	0.85	
Sodium	EPA 3050B	6010B	20	20	2	9/17/98	10/19/98	9360	
Thallium	EPA 3050B	200 8	0.02	0.006	10	9/21/98	10/13/98	0.16	J
Tin	EPA 3050B	200 8	2	0.05	10	9/21/98	10/13/98	10	
Vanadium	EPA 3050B	6010B	2	0.6	2	9/17/98	10/19/98	70	
Zinc	EPA 3050B	6010B	2	0.8	2	9/17/98	10/19/98	169	

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 05975ICP GJI - Sample (8) 10/19/98

Date 10/19/98

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805975
Date Collected: 8/31/98
Date Received: 9/1/98

Total Metals

Sample Name	98364010	Units	mg/Kg (ppm)						
Lab Code	K9805975-009	Basis	Dry						
Test Notes									
Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	29100	
Antimony	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	5	(J)
Arsenic	EPA 3050B	200 8	0.5	0.1	10	9/21/98	10/13/98	15.7	
Barium	EPA 3050B	6010B	1	0.6	2	9/17/98	10/19/98	116	
Beryllium	EPA 3050B	200 8	0.02	0.02	10	9/21/98	10/13/98	0.47	
Cadmium	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	0.61	
Calcium	EPA 3050B	6010B	10	3	2	9/17/98	10/19/98	15300	
Chromium	EPA 3050B	6010B	2	0.7	2	9/17/98	10/19/98	40	
Cobalt	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	12	
Copper	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	111	
Iron	EPA 3050B	6010B	4	4	2	9/17/98	10/19/98	38500	J
Lead	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	65.9	J
Magnesium	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	9990	
Manganese	EPA 3050B	6010B	1	0.4	2	9/17/98	10/19/98	426	
Mercury	7471A	7471A	0.05	0.02	1	9/14/98	9/16/98	0.32	
Nickel	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	25.7	J
Potassium	EPA 3050B	6010B	400	400	2	9/17/98	10/19/98	3710	
Selenium	EPA 3050B	200 8	1	0.3	10	9/21/98	10/13/98	24	J
Silver	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	0.48	
Sodium	EPA 3050B	6010B	20	20	2	9/17/98	10/19/98	14400	
Thallium	EPA 3050B	200 8	0.02	0.006	10	9/21/98	10/13/98	0.17	J
Tin	EPA 3050B	200 8	2	0.05	10	9/21/98	10/13/98	11	
Vanadium	EPA 3050B	6010B	2	0.6	2	9/17/98	10/19/98	87	
Zinc	EPA 3050B	6010B	2	0.8	2	9/17/98	10/19/98	171	

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05975ICP GJ1 Sample (9) 10/19/98

*je*Date *10/19/98*

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NET/12/98

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805975
Date Collected: 8/31/98
Date Received: 9/1/98

Total Metals

Sample Name	98364011	Units	mg/Kg (ppm)
Lab Code	K9805975-010	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	29300	
Antimony	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	6	(J)
Arsenic	EPA 3050B	200 8	0.5	0.1	10	9/21/98	10/13/98	354	J
Barium	EPA 3050B	6010B	1	0.6	2	9/17/98	10/19/98	114	
Beryllium	EPA 3050B	200 8	0.02	0.02	10	9/21/98	10/13/98	0.50	
Cadmium	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	0.6	
Calcium	EPA 3050B	6010B	10	3	2	9/17/98	10/19/98	12700	
Chromium	EPA 3050B	6010B	2	0.7	2	9/17/98	10/19/98	42	
Cobalt	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	13	
Copper	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	156	
Iron	EPA 3050B	6010B	4	4	2	9/17/98	10/19/98	41100	J
Lead	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	826	J
Magnesium	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	10100	
Manganese	EPA 3050B	6010B	1	0.4	2	9/17/98	10/19/98	474	
Mercury	7471A	0.05	0.02	1	9/14/98	9/16/98	0.25		
Nickel	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	284	J
Potassium	EPA 3050B	6010B	400	400	2	9/17/98	10/19/98	3400	
Selenium	EPA 3050B	200 8	1	0.3	10	9/21/98	10/13/98	25	J
Silver	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	0.52	
Sodium	EPA 3050B	6010B	20	20	2	9/17/98	10/19/98	12700	
Thallium	EPA 3050B	200 8	0.02	0.006	10	9/21/98	10/13/98	0.15	J
Tin	EPA 3050B	200 8	2	0.05	10	9/21/98	10/13/98	15	
Vanadium	EPA 3050B	6010B	2	0.6	2	9/17/98	10/19/98	88	
Zinc	EPA 3050B	6010B	2	0.8	2	9/17/98	10/19/98	211	

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05975ICP GJ1 - Sample (10) 10/19/98

Date

10/19/98

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mg/kg

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805975
Date Collected: 8/31/98
Date Received: 9/1/98

Total Metals

Sample Name	98364012							Units	mg/Kg (ppm)
Lab Code	K9805975-011							Basis	Dry
Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	29700	
Antimony	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	ND	WT
Arsenic	EPA 3050B	200 8	0.5	0.1	10	9/21/98	10/13/98	22.3	J
Barium	EPA 3050B	6010B	1	0.6	2	9/17/98	10/19/98	117	
Beryllium	EPA 3050B	200 8	0.02	0.02	10	9/21/98	10/13/98	0.47	
Cadmium	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	0.5	
Calcium	EPA 3050B	6010B	10	3	2	9/17/98	10/19/98	16500	
Chromium	EPA 3050B	6010B	2	0.7	2	9/17/98	10/19/98	41	
Cobalt	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	13	
Copper	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	161	
Iron	EPA 3050B	6010B	4	4	2	9/17/98	10/19/98	43500	J
Lead	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	59.4	J
Magnesium	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	10100	
Manganese	EPA 3050B	6010B	1	0.4	2	9/17/98	10/19/98	520	
Mercury	7471A	7471A	0.05	0.02	1	9/14/98	9/16/98	0.22	
Nickel	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	29.6	J
Potassium	EPA 3050B	6010B	400	400	2	9/17/98	10/19/98	3500	
Selenium	EPA 3050B	200 8	1	0.3	10	9/21/98	10/13/98	24	J
Silver	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	0.45	
Sodium	EPA 3050B	6010B	20	20	2	9/17/98	10/19/98	12300	
Thallium	EPA 3050B	200 8	0.02	0.006	10	9/21/98	10/13/98	0.15	J
Tin	EPA 3050B	200 8	2	0.05	10	9/21/98	10/13/98	13	
Vanadium	EPA 3050B	6010B	2	0.6	2	9/17/98	10/19/98	87	
Zinc	EPA 3050B	6010B	2	0.8	2	9/17/98	10/19/98	209	

Approved By

1S44inc/031695

05975ICP GJ1 - Sample (11) 10/19/98

JF

Date 10/19/98

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WT, J, 10/19/98

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805975
Date Collected: 9/1/98
Date Received: 9/2/98

Total Metals

Sample Name	98364024	Units	mg/Kg (ppm)
Lab Code	K9805975-012	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	27200	
Antimony	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	ND	WT
Arsenic	EPA 3050B	200 8	0.5	0.1	10	9/21/98	10/13/98	17.5	
Barium	EPA 3050B	6010B	1	0.6	2	9/17/98	10/19/98	81	
Beryllium	EPA 3050B	200 8	0.02	0.02	10	9/21/98	10/13/98	0.48	
Cadmium	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	0.40	
Calcium	EPA 3050B	6010B	10	3	2	9/17/98	10/19/98	7320	
Chromium	EPA 3050B	6010B	2	0.7	2	9/17/98	10/19/98	34	
Cobalt	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	12	
Copper	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	56	
Iron	EPA 3050B	6010B	4	4	2	9/17/98	10/19/98	39200	J
Lead	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	30.1	J
Magnesium	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	9640	
Manganese	EPA 3050B	6010B	1	0.4	2	9/17/98	10/19/98	578	
Mercury	7471A	7471A	0.05	0.02	1	9/14/98	9/16/98	0.17	
Nickel	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	23.8	J
Potassium	EPA 3050B	6010B	400	400	2	9/17/98	10/19/98	3300	
Selenium	EPA 3050B	200 8	1	0.3	10	9/21/98	10/13/98	26	J
Silver	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	0.27	
Sodium	EPA 3050B	6010B	20	20	2	9/17/98	10/19/98	15500	
Thallium	EPA 3050B	200 8	0.02	0.006	10	9/21/98	10/13/98	0.13	J
Tin	EPA 3050B	200 8	2	0.05	10	9/21/98	10/13/98	4	WT
Vanadium	EPA 3050B	6010B	2	0.6	2	9/17/98	10/19/98	84	
Zinc	EPA 3050B	6010B	2	0.8	2	9/17/98	10/19/98	119	

WT, J, 11/20/98

Approved By W
 IS44mc/031695
 05975ICP GJ1 - Sample (12) 11/20/98

Date 11/20/98

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805975
Date Collected: 9/1/98
Date Received: 9/2/98

Total Metals

Sample Name	98364025	Units	mg/Kg (ppm)
Lab Code	K9805975-013	Basis.	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	22600	
Antimony	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	ND	WT
Arsenic	EPA 3050B	200 8	0.5	0.1	10	9/21/98	10/13/98	12.2	
Barium	EPA 3050B	6010B	1	0.6	2	9/17/98	10/19/98	157	
Beryllium	EPA 3050B	200 8	0.02	0.02	10	9/21/98	10/13/98	0.42	
Cadmum	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	0.8	
Calcium	EPA 3050B	6010B	10	3	2	9/17/98	10/19/98	7180	
Chromium	EPA 3050B	6010B	2	0.7	2	9/17/98	10/19/98	35	
Cobalt	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	10	
Copper	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	65	
Iron	EPA 3050B	6010B	4	4	2	9/17/98	10/19/98	32200	J
Lead	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	58.2	J
Magnesium	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	8230	
Manganese	EPA 3050B	6010B	1	0.4	2	9/17/98	10/19/98	328	
Mercury	7471A	7471A	0.05	0.02	1	9/14/98	9/16/98	0.24	
Nickel	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	23.7	J
Potassium	EPA 3050B	6010B	400	400	2	9/17/98	10/19/98	2800	
Selenium	EPA 3050B	200 8	1	0.3	10	9/21/98	10/13/98	24	J
Silver	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	0.59	
Sodium	EPA 3050B	6010B	20	20	2	9/17/98	10/19/98	12500	
Thallium	EPA 3050B	200 8	0.02	0.006	10	9/21/98	10/13/98	0.16	J
Tin	EPA 3050B	200 8	2	0.05	10	9/21/98	10/13/98	6	
Vanadium	EPA 3050B	6010B	2	0.6	2	9/17/98	10/19/98	73	
Zinc	EPA 3050B	6010B	2	0.8	2	9/17/98	10/19/98	139	

mg/kg

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05975ICP GJ1 Sample (13) 11/20/98

Date 11/20/98

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F. Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805975
Date Collected: 9/1/98
Date Received: 9/2/98

Total Metals

Sample Name	98364026	Units	mg/Kg (ppm)
Lab Code	K9805975-014	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	22500	
Antimony	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	ND	WT
Arsenic	EPA 3050B	200 8	0.5	0.1	10	9/21/98	10/13/98	8.5	
Barium	EPA 3050B	6010B	1	0.6	2	9/17/98	10/19/98	82	
Beryllium	EPA 3050B	200 8	0.02	0.02	10	9/21/98	10/13/98	0.41	
Cadmium	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	0.4	WT
Calcium	EPA 3050B	6010B	10	3	2	9/17/98	10/19/98	6200	
Chromium	EPA 3050B	6010B	2	0.7	2	9/17/98	10/19/98	30	
Cobalt	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	11	
Copper	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	43	
Iron	EPA 3050B	6010B	4	4	2	9/17/98	10/19/98	29300	J
Lead	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	20.5	J
Magnesium	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	8060	
Manganese	EPA 3050B	6010B	1	0.4	2	9/17/98	10/19/98	336	
Mercury	7471A	7471A	0.05	0.02	1	9/14/98	9/16/98	0.11	
Nickel	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	23.8	J
Potassium	EPA 3050B	6010B	400	400	2	9/17/98	10/19/98	2600	
Selenium	EPA 3050B	200 8	1	0.3	10	9/21/98	10/13/98	23	J
Silver	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	0.17	
Sodium	EPA 3050B	6010B	20	20	2	9/17/98	10/19/98	12100	
Thallium	EPA 3050B	200 8	0.02	0.006	10	9/21/98	10/13/98	0.12	J
Tin	EPA 3050B	200 8	2	0.05	10	9/21/98	10/13/98	3	WT
Vanadium	EPA 3050B	6010B	2	0.6	2	9/17/98	10/19/98	72	
Zinc	EPA 3050B	6010B	2	0.8	2	9/17/98	10/19/98	92	

WT/J

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 05975ICP GJ1 - Sample (14) 11/20/98

Date 11/20/98

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805975
Date Collected: 9/1/98
Date Received: 9/2/98

Total Metals

Sample Name	98364027	Units	mg/Kg (ppm)						
Lab Code	K9805975-015	Basis	Dry						
Test Notes									
Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	23600	
Antimony	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	ND	WT
Arsenic	EPA 3050B	200 8	0 5	0 1	10	9/21/98	10/13/98	11 1	
Barium	EPA 3050B	6010B	1	0 6	2	9/17/98	10/19/98	82	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	9/21/98	10/13/98	0 42	
Cadmium	EPA 3050B	200 8	0 2	0 02	10	9/21/98	10/13/98	0 3	WT
Calcium	EPA 3050B	6010B	10	3	2	9/17/98	10/19/98	6970	
Chromium	EPA 3050B	6010B	2	0 7	2	9/17/98	10/19/98	31	
Cobalt	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	10	
Copper	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	47	
Iron	EPA 3050B	6010B	4	4	2	9/17/98	10/19/98	32100	J
Lead	EPA 3050B	200 8	0 02	0 004	10	9/21/98	10/13/98	24 3	J
Magnesium	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	8610	
Manganese	EPA 3050B	6010B	1	0 4	2	9/17/98	10/19/98	334	
Mercury	7471A	7471A	0 05	0 02	1	9/14/98	9/16/98	0 15	
Nickel	EPA 3050B	200 8	0 2	0 02	10	9/21/98	10/13/98	22 7	J
Potassium	EPA 3050B	6010B	400	400	2	9/17/98	10/19/98	2900	
Selenium	EPA 3050B	200 8	1	0 3	10	9/21/98	10/13/98	25	J
Silver	EPA 3050B	200 8	0 02	0 004	10	9/21/98	10/13/98	0 19	
Sodium	EPA 3050B	6010B	20	20	2	9/17/98	10/19/98	13700	
Thallium	EPA 3050B	200 8	0 02	0 006	10	9/21/98	10/13/98	0 12	J
Tin	EPA 3050B	200 8	2	0 05	10	9/21/98	10/13/98	4	WT
Vanadium	EPA 3050B	6010B	2	0 6	2	9/17/98	10/19/98	74	
Zinc	EPA 3050B	6010B	2	0 8	2	9/17/98	10/19/98	101	

mag 1/2/99

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1S44mc031695
05975ICP GJ1 - Sample (15) 11/20/98

Date 11/20/98 00020

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805975
Date Collected: 9/1/98
Date Received: 9/2/98

Total Metals

Sample Name	98364028	Units	mg/Kg (ppm)
Lab Code	K9805975-016	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	5560	
Antimony	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	ND	WT
Arsenic	EPA 3050B	200 8	0.5	0.1	10	9/21/98	10/13/98	18	
Barium	EPA 3050B	6010B	1	0.6	2	9/17/98	10/19/98	14	
Beryllium	EPA 3050B	200 8	0.02	0.02	10	9/21/98	10/13/98	0.11	
Cadmium	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	0.13	WT
Calcium	EPA 3050B	6010B	10	3	2	9/17/98	10/19/98	2750	
Chromium	EPA 3050B	6010B	2	0.7	2	9/17/98	10/19/98	10	
Cobalt	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	4	
Copper	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	10	
Iron	EPA 3050B	6010B	4	4	2	9/17/98	10/19/98	13600	WT
Lead	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	564	
Magnesium	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	2450	
Manganese	EPA 3050B	6010B	1	0.4	2	9/17/98	10/19/98	161	
Mercury	7471A	7471A	0.05	0.02	1	9/14/98	9/16/98	ND	
Nickel	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	74	
Potassium	EPA 3050B	6010B	400	400	2	9/17/98	10/19/98	530	
Selenium	EPA 3050B	200 8	1	0.3	10	9/21/98	10/13/98	10	
Silver	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	0.14	
Sodium	EPA 3050B	6010B	20	20	2	9/17/98	10/19/98	3010	
Thallium	EPA 3050B	200 8	0.02	0.006	10	9/21/98	10/13/98	0.03	WT
Tin	EPA 3050B	200 8	2	0.05	10	9/21/98	10/13/98	2	WT
Vanadium	EPA 3050B	6010B	2	0.6	2	9/17/98	10/19/98	40	
Zinc	EPA 3050B	6010B	2	0.8	2	9/17/98	10/19/98	28	

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 IS44mc/031695
 05975ICP GJ1 - Sample (16) 11/20/98

Date 11/20/98

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805975
Date Collected: 9/1/98
Date Received: 9/2/98

Total Metals

Sample Name	98364029	Units	mg/Kg (ppm)
Lab Code	K9805975-017	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	26400	
Antimony	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	ND	WT
Arsenic	EPA 3050B	200 8	0.5	0.1	10	9/21/98	10/13/98	14.3	
Barium	EPA 3050B	6010B	1	0.6	2	9/17/98	10/19/98	93	
Beryllium	EPA 3050B	200 8	0.02	0.02	10	9/21/98	10/13/98	0.45	
Cadmium	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	0.48	
Calcium	EPA 3050B	6010B	10	3	2	9/17/98	10/19/98	7340	
Chromium	EPA 3050B	6010B	2	0.7	2	9/17/98	10/19/98	38	
Cobalt	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	13	
Copper	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	93	
Iron	EPA 3050B	6010B	4	4	2	9/17/98	10/19/98	42900	WT
Lead	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	43.9	
Magnesium	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	9800	
Manganese	EPA 3050B	6010B	1	0.4	2	9/17/98	10/19/98	404	
Mercury	7471A	7471A	0.05	0.02	1	9/14/98	9/16/98	0.29	
Nickel	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	23.4	
Potassium	EPA 3050B	6010B	400	400	2	9/17/98	10/19/98	3200	
Selenium	EPA 3050B	200 8	1	0.3	10	9/21/98	10/13/98	26	
Silver	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	0.38	
Sodium	EPA 3050B	6010B	20	20	2	9/17/98	10/19/98	14200	
Thallium	EPA 3050B	200 8	0.02	0.006	10	9/21/98	10/13/98	0.13	
Tin	EPA 3050B	200 8	2	0.05	10	9/21/98	10/13/98	6	
Vanadium	EPA 3050B	6010B	2	0.6	2	9/17/98	10/19/98	83	
Zinc	EPA 3050B	6010B	2	0.8	2	9/17/98	10/19/98	175	

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Date 11/20/98

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805975
Date Collected: 9/2/98
Date Received: 9/3/98

Total Metals

Sample Name	98364030	Units	mg/Kg (ppm)
Lab Code	K9805975-018	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	28000	
Antimony	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	ND	WT
Arsenic	EPA 3050B	200 8	0.5	0.1	10	9/21/98	10/13/98	17.2	
Barium	EPA 3050B	6010B	1	0.6	2	9/17/98	10/19/98	119	
Beryllium	EPA 3050B	200 8	0.02	0.02	10	9/21/98	10/13/98	0.45	
Cadmium	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	0.64	
Calcium	EPA 3050B	6010B	10	3	2	9/17/98	10/19/98	11800	
Chromium	EPA 3050B	6010B	2	0.7	2	9/17/98	10/19/98	52	
Cobalt	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	13	
Copper	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	126	
Iron	EPA 3050B	6010B	4	4	2	9/17/98	10/19/98	45000	WT
Lead	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	71.2	
Magnesium	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	11200	
Manganese	EPA 3050B	6010B	1	0.4	2	9/17/98	10/19/98	497	
Mercury	7471A	7471A	0.05	0.02	1	9/14/98	9/16/98	0.34	
Nickel	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	31.0	
Potassium	EPA 3050B	6010B	400	400	2	9/17/98	10/19/98	3500	
Selenium	EPA 3050B	200 8	1	0.3	10	9/21/98	10/13/98	27	
Silver	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	0.44	
Sodium	EPA 3050B	6010B	20	20	2	9/17/98	10/19/98	16100	
Thallium	EPA 3050B	200 8	0.02	0.006	10	9/21/98	10/13/98	0.15	
Tin	EPA 3050B	200 8	2	0.05	10	9/21/98	10/13/98	8	
Vanadium	EPA 3050B	6010B	2	0.6	2	9/17/98	10/19/98	87	
Zinc	EPA 3050B	6010B	2	0.8	2	9/17/98	10/19/98	220	

mg/Kg (ppm)

Approved By 
IS44mo/031695
05975ICP GJI - Sample (18) 11/20/98

Date 11/20/98

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805975
Date Collected: 9/2/98
Date Received: 9/3/98

Total Metals

Sample Name	98364031	Units	mg/Kg (ppm)
Lab Code	K9805975-019	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	30000	
Antimony	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	ND	WT
Arsenic	EPA 3050B	200 8	0.5	0.1	10	9/21/98	10/13/98	17.4	
Barium	EPA 3050B	6010B	1	0.6	2	9/17/98	10/19/98	107	
Beryllium	EPA 3050B	200 8	0.02	0.02	10	9/21/98	10/13/98	0.48	
Cadmium	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	1.0	
Calcium	EPA 3050B	6010B	10	3	2	9/17/98	10/19/98	9130	
Chromium	EPA 3050B	6010B	2	0.7	2	9/17/98	10/19/98	44	
Cobalt	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	14	
Copper	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	102	
Iron	EPA 3050B	6010B	4	4	2	9/17/98	10/19/98	40900	J
Lead	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	59.9	
Magnesium	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	11000	
Manganese	EPA 3050B	6010B	1	0.4	2	9/17/98	10/19/98	474	
Mercury	7471A	7471A	0.05	0.02	1	9/14/98	9/16/98	0.48	
Nickel	EPA 3050B	200 8	0.2	0.02	10	9/21/98	10/13/98	25.8	
Potassium	EPA 3050B	6010B	400	400	2	9/17/98	10/19/98	3800	
Selenium	EPA 3050B	200 8	1	0.3	10	9/21/98	10/13/98	28	
Silver	EPA 3050B	200 8	0.02	0.004	10	9/21/98	10/13/98	0.46	
Sodium	EPA 3050B	6010B	20	20	2	9/17/98	10/19/98	15100	
Thallium	EPA 3050B	200 8	0.02	0.006	10	9/21/98	10/13/98	0.15	
Tin	EPA 3050B	200 8	2	0.05	10	9/21/98	10/13/98	7	
Vanadium	EPA 3050B	6010B	2	0.6	2	9/17/98	10/19/98	89	
Zinc	EPA 3050B	6010B	2	0.8	2	9/17/98	10/19/98	254	

mg/kgs

Approved By _____ 
 IS44mc031695
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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805975
Date Collected: 9/2/98
Date Received: 9/3/98

Total Metals

Sample Name	98364032	Units	mg/Kg (ppm)
Lab Code	K9805975-020	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	21500	
Antimony	EPA 3050B	6010B	10	5	2	9/17/98	10/19/98	7	(J)
Arsenic	EPA 3050B	200 8	0 5	0 1	10	9/21/98	10/13/98	12 0	
Barium	EPA 3050B	6010B	1	0 6	2	9/17/98	10/19/98	110	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	9/21/98	10/13/98	0 39	
Cadmium	EPA 3050B	200 8	0 2	0 02	10	9/21/98	10/13/98	0 4	
Calcium	EPA 3050B	6010B	10	3	2	9/17/98	10/19/98	7080	
Chromium	EPA 3050B	6010B	2	0 7	2	9/17/98	10/19/98	35	
Cobalt	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	10	
Copper	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	66	
Iron	EPA 3050B	6010B	4	4	2	9/17/98	10/19/98	31600	(J)
Lead	EPA 3050B	200 8	0 02	0 004	10	9/21/98	10/13/98	34 2	
Magnesium	EPA 3050B	6010B	2	2	2	9/17/98	10/19/98	8630	
Manganese	EPA 3050B	6010B	1	0 4	2	9/17/98	10/19/98	379	
Mercury	7471A	7471A	0 05	0 02	1	9/14/98	9/16/98	0 14	
Nickel	EPA 3050B	200 8	0 2	0 02	10	9/21/98	10/13/98	22 8	
Potassium	EPA 3050B	6010B	400	400	2	9/17/98	10/19/98	2500	
Selenium	EPA 3050B	200 8	1	0 3	10	9/21/98	10/13/98	24	
Silver	EPA 3050B	200 8	0 02	0 004	10	9/21/98	10/13/98	0 32	
Sodium	EPA 3050B	6010B	20	20	2	9/17/98	10/19/98	10000	
Thallium	EPA 3050B	200 8	0 02	0 006	10	9/21/98	10/13/98	0 11	
Tin	EPA 3050B	200 8	2	0 05	10	9/21/98	10/13/98	6	
Vanadium	EPA 3050B	6010B	2	0 6	2	9/17/98	10/19/98	69	
Zinc	EPA 3050B	6010B	2	0 8	2	9/17/98	10/19/98	134	

Approved By
 IS44mo/031695

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